

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims

1. (currently amended) An apparatus comprising:

(a) a substrate mount for receiving a substrate,

(b) a dispensing device for dispensing reagents for synthesizing a biopolymer on a surface of said substrate, and

(c) a first optical system for positioning said substrate mount along said y-axis and a second optical system for positioning said dispensing device along said x-axis, said first and second optical systems cooperating to position said substrate mount and said dispensing device relative to one another,

wherein: (i) one of said substrate mount and said dispensing device is adapted for translation along a y-axis and for rotation about a central axis of the substrate mount that is parallel to a z-axis, and (ii) the other of said substrate mount and said dispensing device is adapted to move along an x-axis transversely to the direction of movement of said one of said substrate mount and said dispensing device, and is further adapted for movement along an axis that is parallel to the z-axis so that a distance and an angle of orientation between said substrate mount and said dispensing device can be adjusted to maintain a parallel relationship between said surface of said substrate and said dispensing device.

2. (previously presented) An apparatus according to Claim 1 further comprising a touch system for positioning said substrate and said dispensing device along a z-axis wherein said touch system comprises at least two opposing touch probes wherein one of said touch probes is affixed to a support member of said apparatus to which the substrate mount is affixed and the other

of said touch probes is affixed to a frame member of said apparatus to which said dispensing device is affixed.

3. (previously presented) An apparatus according to Claim 1 wherein said first optical system for positioning said substrate mount comprises at least one image sensor and said substrate comprises at least one target image for imaging by said image sensor.

4. (previously presented) An apparatus according to Claim 1 wherein said apparatus further comprises a calibration system, said first and second optical systems and said calibration system cooperating to position said substrate mount along said y-axis and said dispensing device along said x-axis.

5. (previously presented) An apparatus according to Claim 4 wherein the calibration system comprises a locator device having a predetermined fixed target location and a camera acting in cooperation with said optical systems.

6. (previously presented) An apparatus according to Claim 2 wherein said substrate mount is adapted such that its orientation is adjusted to align said substrate along said y-axis as a result of input from said first optical system for positioning said substrate mount and wherein said dispensing device is adapted such that its orientation is adjusted to align said dispensing device along said x-axis as a result of input from said second optical system for positioning said dispensing device.

7. (previously presented) An apparatus according to Claim 6 wherein said first and second optical systems communicate with a computer, which provides input from said optical systems to said substrate mount and to said dispensing device and said touch system communicates with said computer.

8. (previously presented) An apparatus according to Claim 1 further comprising a delivery device for delivering said substrate to said substrate mount, said delivery device having associated therewith a delivery device optical system for positioning said substrate to be within the field of view of said first optical system.

9. (previously presented) An apparatus according to Claim 8 wherein said second optical system comprises at least one image sensor and said substrate comprises at least one target image for imaging by said image sensor.

10-25. (canceled)

26. (currently amended) A method for synthesizing an array of biopolymers on a surface of a substrate, said method comprising, in multiple rounds of subunit additions, adding one or more polymer subunits at each of multiple feature locations on said surface to form one or more arrays on said surface, each round of subunit additions comprising:

(a) bringing said substrate and a dispensing system for dispensing said polymer subunits for the synthesis of said biopolymers into a dispensing position relative to said activated discrete sites on said surface;

- (b) positioning said substrate along a y-axis using a first optical system;
- (c) positioning said dispensing system along an x-axis using a second optical system;
- (d) positioning said dispensing system along a z-axis using at least one touch system wherein said touch system comprises at least two opposing touch probes wherein one of said touch probes is affixed to a support member of said apparatus to which the substrate mount is affixed and the other of said touch probes is affixed to a frame member of said apparatus to which said dispensing device is affixed; ~~(e) adjusting to adjust a distance and an angle of orientation of said dispensing system in relation to said substrate to maintain a parallel relationship between said surface of said substrate and said dispensing device;~~
- ~~(f) dispensing said polymer subunits to said discrete sites; and~~
- ~~(g) removing said substrate and/or said dispensing system from said relative dispensing position.~~

27. (previously presented) A method according to Claim 26 wherein said first optical system for positioning said substrate mount comprises two or more image sensors and said substrate comprises a corresponding number of target images.

28. (previously presented) A method according to Claim 26 wherein said positioning of step (a) involves a calibration system, said first and second optical systems and said calibration system cooperating to position said substrate mount along said y-axis and said dispensing device along said x-axis.

29. (previously presented) A method according to Claim 28 wherein said calibration system comprises a locator device having a predetermined fixed target location and a camera acting in cooperation with said optical systems.

30. (previously presented) A method according to Claim 29 wherein adjustments are made to the orientation of said substrate along said y-axis as a result of input from said first optical system and wherein adjustments are made to the orientation of said dispensing device along said x-axis as a result of input from said second optical system.

31. (previously presented) A method according to Claim 26 wherein said touch probes are aligned optically.

32. (original) A method according to Claim 26 wherein said biopolymers are polynucleotides or polypeptides.

33. (original) A method according to Claim 32 further comprising exposing the array to a sample and reading the array.

34. (original) A method comprising forwarding data representing a result obtained from a reading of an array exposed according to the method of Claim 33.

35. (original) A method comprising transmitting to a remote location data representing a result of an interrogation obtained by reading of an array exposed according to the method of Claim 33.

36. (original) A method comprising receiving data representing a result of an interrogation obtained by reading of an array exposed according to the method of Claim 33.

Claims 37-47. (canceled)

48. (previously presented) An apparatus according to claim 2 wherein one of said touch probes is an upwardly pointing probe and the other of said touch probes is a downwardly pointing probe.

49. (previously presented) A method according to claim 26 wherein one of said touch probes is an upwardly pointing probe and the other of said touch probes is a downwardly pointing probe.

50. (previously presented) An apparatus according to claim 1, wherein the other of said substrate mount and said dispensing device is further adapted for movement so that said angle of orientation between said surface of said substrate and said dispensing device can be adjusted to maintain a parallel relationship between said surface of said substrate and said dispensing device as a thickness of said substrate varies.

51. (previously presented) A method according to claim 26, wherein adjusting an angle of orientation of said dispensing system in relation to said substrate to maintain a parallel relationship between said surface of said substrate and said dispensing device comprises adjusting said angle of orientation of said dispensing system in relation to said substrate to maintain a parallel relationship between said surface of said substrate and said dispensing device as a thickness of said substrate varies.